

Interesting Facts:

- Growth in rigs up 415% from January, 2010
- Possibly 200 years worth
- Single largest impact of an opportunity we will encounter in our lifetime
- 1.5 billion cu ft of natural gas every day will develop to 5 – 7 billion cu ft of natural gas every day within the next decade
- Data from: Discovering Unconventional Gas Conference held in Pittsburgh last week.
- The effects of this are being felt across the world
- Unlocking shale now guarantees 100 year supply of natural gas

Conference goals:

- Understand the magnitude & opportunities
- View the Marcellus activity as part of our long-term plan
- Learn how to best communicate (programs, initiatives, grants, etc.)

Introductions:

Dr. Daniel J. Obara, President, Westmoreland County Community College

- Key aspects: recruitment, training, placement
- The scope and magnitude of training is such that there is something for everyone

Mr. Louis D'Amica, Executive Dir., Independent Oil & Gas Producers of PA

- Estimates of reserves makes this the second largest natural gas field in the world
- ¼ of million jobs over the next few years just in industry related jobs and does not include related jobs
- The most important resource we have in PA are people

Dr. Denise Calvin, Director, Penn State Cooperative Extension

Dr. Ed Ireland, Executive Dir., Barnett Shale in Texas (www.bseec.org)

- Strong movement that would like to shut down all gas development
- 24 counties 5000 square miles in Texas
- layer of rock 7,000 feet below the surface
- first well drilled in 1981
- over 1,000 producing natural gas
- George Mitchell worked for 20 years to figure out how to get natural gas out of rock
- In 2002 Mitchell Energy merged w/Devon, an off-shore drilling company, that worked with horizontal drilling
- Water, sand, and additives that make the process possible

- Barnett Shale compared to Marcellus shale is tiny. Currently, BS is the largest producing shale play in the world. That will change as MS comes into production.
- ***Lessons Learned in the Barnett Shale:***
 - Natural gas stakeholders must reach out to the public. You cannot wait to do that...
 - Must emphasize the economic benefits of shale gas development
 - 1.3 million jobs in Texas
 - 12% of total employment
 - cleanest fossil fuel
 - highly efficient
 - helps improve our country's energy security
 - cleanest burning hydrocarbon we have...mostly hydrogen (1 carbon molecule), but the single most active anti-drilling people out there
 - non-fossil energy use grow rapidly, but fossil fuels still provide 79 percent of total energy use in 2030
 - utilization rate of a wind farm is 9% which means you need to have something that is going to fill in the gap...this could be natural gas
 - Natural gas is the only domestic fuel that can be scaled up over the next decade in order to achieve significant reductions in the use of foreign oil and carbon emissions.
 - The shale fields in the US are the key to future natural gas supplies in the US, Canada and the world.
 - Natural gas companies must adapt to new situations
 - Regulators and industry must develop a cooperative relationship
 - The regulators need to understand what is important to them
 - 18 people including City Council, citizens and four industry representatives
 - Developed recommendations to the City Council that resulted in many revisions to the City's Gas Drilling Ordinances
 - Noise, compressors, protected use definitions, setbacks, environmental impacts, pipelines, public notices, roads
 - Natural gas companies must stay ahead of the issues
- ***Issues in the Barnett Shale***
 - Early issues: noise, lighting, safety, truck traffic, water use, water disposal
 - Later issues: earthquakes, contribution to ozone levels
 - Latest issue: air emissions and hydraulic fracturing
 - BSEEC Study Background:

- BSEEC wanted to provide the public with data about air quality in the Barnett Shale
 - Benzene, a known human carcinogen, the highest concentration of benzene humans get is when they put gasoline in their cars
 - Hydraulic Fracturing
 - Allegations that fracturing pollutes ground water
 - Reports of companies refusing to disclose the contents of frac fluids
 - The word “fracking” has become an epithet used to describe the entire drilling process
 - Fracking actually not a word but something that has been used by the activists as the process from gas drilling that is dangerous and toxic.
- Be an advocate...it's about education and advocacy. Politicians only hear the people who come to the meetings, which are typically the people on the activists side of people who do not want it.
- Advice for educators that will help them work with industry to develop a qualified workforce in the Appalachian region
 - Low level of energy education starting in the first grade
 - We need to have education at all levels about how our energy sources fit together for the future. Over time this will have an impact.

Dr. Patrick Gerity, VP Continuing Education, Workforce & Community Development/Executive Director Public Safety and Homeland Security, Westmoreland County Community College AND Larry Michael, Executive Director of Workforce and Economic Development, PA College of Technology

- www.msetc.org for outline of jobs
- Grants & Funding
 - PA Dept. of Labor & Industry
 - National Science Foundation
 - US Dept. of Labor
 - Marcellus Applied Tech & Emergency Response Training Site
- What is ShaleNET?
 - An organization that enables us to collaborate among key stakeholders to address workforce issues related to the natural gas industry
 - It is a grant - \$4.9 million from US Dept of Labor over 3 year
- PIOGA – PA Independent Oil & Gas Association
- HPO – High Priority Occupations: derrick operators, rotary drill operators, service unit operators, roustabouts, welding and brazing operators, truck drivers

- Job outreach to: veterans, farmers, construction, dislocated, underemployed, unemployed, CTC, Career changers
 - Marcellus Shale Talent Matching System
 - Candidates (gaps) matching to industries need
 - Industry orientation, interviews & training
 - Lots of entry-level jobs out there
 - Well-tenders, Roustabouts, Truck drivers, Welders, etc.
 - Sometimes 14 days on and 14 days off, do you like working outside, do you like working with others
 - Hoping to accelerate and get people who want jobs ready for nice-paying, high-benefit jobs
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Danielle Boston, Director of Public Outreach, PA Independent Oil & Gas Association

- Search for Marcellus Shale permits that have been awarded vs. how many wells have been drilled
- 350,000 wells – 70,000 currently active
- Search for September 2010 County Unemployment Rates
- Need anywhere from high school to post-secondary level people
- **Challenges to Growing the Workforce:** job awareness, educational providers, lack of oil/gas specific curriculum, hands-on equipment for training, retention/work culture
- **What it takes to work in this industry?** D & A free, mechanical aptitude, physically fit, adaptable 24/7 operations, dependable & punctual, leadership skills, attention to detail, high stress tolerance, self control, work cooper with others, show independence, initiative & innovation, ability to travel, valid driver's license, enjoy working outdoors in all types of weather, commitment to safety & environmental protection
 - Who in this room would not want 17 weeks off per year?
- Workers from out of state are here because we cannot get people in PA to get off unemployment and go to work. People are not motivated to get jobs.
- **What the oil/gas industry must do to help grow the Workforce:**
 - Create a formal industry advisory board statewide
 - Develop and share standardized curriculum
 - Industry donations of equip
 - Expanded job awareness campaign
 - Utilize the PA CareerLinks or one-stops for job candid
 - Energy education in primary and secondary schools job awareness for parents

- What we can do together:
 - Enhanced communication/education
 - Industry representation on workforces investment boards and building stronger relationship w/PA CareerLink offices
 - PIOGA monthly newsletter
 - Two-way communication regarding issues/obstacles
 - Systematic approach to surveys, meetings, etc
 - The oil & gas industry's commitment to training and education for PA
 - Pa CareerLink
 - Career awareness days
 - ShaleNET workforces forum
 - Jr.
 - The challenge program – energy sector presentations
 - Green energy fairs
 - Donations & sponsorships
 - Job shadowing and internships
 - Some companies have a set internal hiring mandates
 - Natural Gas Careers Fact Sheet: Search for “Careers in the Natural Gas Industry”
 - Great Jobs in Oil and Gas CD-Rom
 - MEET-U (Mobile Energy Education Training Unit) – The Drake Well Museum's
 - **Finding Jobs:**
 - State: PA CareerLinks
 - Industry Trade Associations
 - www.pioga.org
 - www.marcelluscoalition.org
 - For profits
 - Career sites ... many!
 - The “Business Case” for building our PA workforce
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Marcellus Development Process

- Bob Garland – Universal Well Services
 - 60% of the water is recycled
 - **What it takes to be a good candidate?**
 - Good work ethic, D & A free (#1), mechanical aptitude, physically fit, flexible hours, being punctual for shift, ability to travel, valid driver's license, enjoy working outdoors in all types of weather, safety and environmental protection (top priority)

- **Why Natural Gas?**
 - Abundant supply, near-term supply impact, long-term supply stability, onshore resource plays, production in 32 states, enhanced pipeline infrastructure, expanded LNG capacity.
- What is tcf? Natural gas is generally priced and sold in units of a thousand cubic feet. Units of a trillion cubic feet are often used to measure large quantities, as in resources or reserves in the ground, or annual national energy consumption. A tcf is one billion mcf.
- **The process**
 - Preparation (Mineral & property leasing)
 - Exploration 3D model through seismic information
 - Site Preparation – need to consider storm water runoff from all land areas disturbed during construction (Digs made if the area is one where arrow heads might be found.) Plus, additional Storm water Management Practices
 - Pre-drilling phase (geological, seismic, public land, mineral rights, permitting, staking, water management)
 - Test every well within 1000 – 2500 feet
 - Horizontal Perforating – ½” diameter holes within the pipe
 - Sand with water with additives. Small cracks in the rock are filled with sand which allows the well to flow back
 - 400,000 – 500,000 gallons per stage
 - 5,000,000 gallons for a horizontal well
 - 300,000 – 500,000 pounds sand per stage (one railcar holds 200,000)
 - 3,000,000 – 5,000,000 pound total for a horizontal well
 - Fracturing fluids are recycled
 - Production location roughly the size of a two-car garage
 - Roadways
- College degree positions
 - Environmental engineers
 - Environmental, health and safety technicians
 - Drilling – open loop system or closed loop system, horizontal drilling (6 horizontal on 1 pad vs. 24 vertical wells)
 - Workforce – Engineers making \$80/year after graduation
 - Drilling Engineers making \$80K after college - BS degree in Petroleum Engineering. Degrees at PSU, Pitt, Marietta
 - Logging engineer – 2 -4 year degree
 - Equipment operators – HS or GED
 - Geophysicists – BS or MS degree in Geophysics

- Electronics technicians
- We require good literacy skills for:
 - Passing exams
 - Understanding safety requirements
 - DOT laws for drivers
 - Read equipment specs and manual

“We” are dropping the ball with math because some students need algebra, trigonometry, geometry, and be able read graphs. These are basic skills.

More facts:

- Six hour testing –general aptitude, dexterity tests, etc...
- 420 different people needed for 150 different occupations across 19 counties
- Each well requires 11.53 – 12.91 full time development jobs
- 3,503 – 14, 122 pre-drill, drilling, and completion
- 258 – 826 production 7 reclamation
 - Centre, Clinton, Lycoming, Snyder, Union, etc....

Tom Murphy, Co-Director Marcellus Initiative for Outreach & Research, Penn State Cooperative Extension

- Change in our energy future – bio, wind
- Utilization piece is key
 - Feedstock
 - Power generation – conventional vs. fuel cell
 - Industrial use
 - Plastics
 - Transportation fuels (Are we able to make the change to use natural gas?)
 - \$8 million in new alternative fuel usage
 - 21 locations in PA
 - CNG for private/public use
- How big? How long? 100+ year supply, decades to drill/produce
- 70+ energy companies looking at Marcellus and increasing
- \$8 billion+ collectively 2010 - \$55 billion by 2014
 - Royalties to PA landowners - \$250 billion?
 - Variable lease rates - \$750 to \$6500/ac
 - Asset sales to here and from here

- www.marcellus.psu.edu
 - www.naturalgas.psu.edu
 - www.msetc.org
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Timothy Kelsey – Professor of Agricultural Economics, State Program Leader for Marcellus Shale,
Penn State Cooperative Extension

- Union County population grown - slow Snyder – very slow
 - Some Marcellus shale over Snyder County
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ShaleNET Workforce Forum – Secondary Session 12/6/2010 10:07:

Kai Schafft - PSU

- The process of assessing or estimating, in advance, the social consequences likely to follow from specific policy actions or project development...
- Development proceeding unevenly
- Boomtowns and Schools – The “boom town” phenomenon: the social and economic effects of rapid natural resource development
- Opportunities & Challenges
 - Population and community change – population increases can be a boom to areas in long term economic decline, but what are the needs of new populations and how long with they remain?
 - Marcellus curricula linked to PA state standards
<http://www.efmr.org/edu/MarcellusShale2010.pdf>
 - Opportunities for women? When we educate about Marcellus opportunities and talk about the gas industry, what messages are we conveying to girls?
- Unanticipated Challenges
 - Effects on HS students – increase post-secondary attendance? Increased dropout rates?

General Comments/Thoughts

- When do we communicate the opportunities to students?
- How do we get students hooked on the possibilities that energy awareness has to offer?
- Middle schools and high schools should be teaching the same things we have always taught...not to lose your driver's license
- Make jobs specific – Career Pathways

Jeanette Carter – CTE Program Response

- What role do we play in these short-term, high-wage jobs?
- We should focus on long-term, high-skilled, high-wage jobs. The jobs that are going to be here after the boom. The jobs that are going to be here long after the initial work is done.
- Six CIP codes that the ShaleNET is working towards.
 - New CIP Program Development - 46.0504 Well Drilling/Driller
 - 47-1011.00 First-Line Supervisors/Managers of Construction Trades and Extraction Workers
 - 47-5011.00 Derrick Operator , Oil and Gas
 - 47-5012.00 Rotary Drill Operator, Oil and Gas

- More on PowerPoint

Majors at Penn College Applicable to Natural Gas Technologies

- What are the needs of the industry? (Opportunities for graduates?)
- We need people who can speak intelligently, communicate, computer savvy, math skills
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